Chapter 2

Emergency and Disaster Preparedness and Response

Designing an Emergency and Disaster Prevention and Response Program essentially involves carrying out the tasks outlined in the previous chapter, as well as others that will be described below. This chapter will focus in greater detail on the Emergency Operations Plans.

If you would like more information on disaster prevention and mitigation measures for water supply and sewerage systems, please consult the bibliography at the end of this book.

Emergency and Disaster Management

Objective: To ensure, in emergency and disaster situations, the least possible impact on water supply and sewerage services, as well as an effective response that contributes to preserving the health of the population.

Generally, water supply and sewerage companies and agencies have standard procedures for routine repair of damage to canals, pipes, and other infrastructure, responding to electrical power failures, fluctuations in the quality and quantity of the water supply, etc. Such procedures might be described as the first level of intervention in emergency management, which makes it a natural starting point and foundation for the development of actions aimed at responding to disasters or major emergencies. This first level of intervention has also served to

Distributing emergency drinking water supplies following Hurricane Pauline in Mexico in 1997.
C. Osorio, 1997

provide water supply and sewerage companies with a certain degree of experience in disaster management whenever major adverse events have taken place.

History reveals that greater attention has been paid to rehabilitation and reconstruction efforts than to making them unnecessary in the first place. This approach should be changed by setting in motion emergency and disaster reduction plans. These must focus on the preventive maintenance of structures and equipment, as well as the establishment and updating of those operational procedures and manuals that help to integrate the accumulated expertise of the staff.

As noted elsewhere, emergency and disaster management consists of a coherent set of planning, organization, control, evaluation, and training activities, involving all institutional, human, and operational resources that should be developed and integrated into the agency or company. The objective is to restore in the shortest time possible those water supply and sewerage services most essential to the population.

In order to launch the emergency and disaster management process, an official state of alert must first be declared. This should immediately set in motion the units or departments of the company or agency in charge of responding to each stage of the disaster cycle. (It should be noted that prevention and mitigation activities have a role to play even after a disaster has struck.)

Bearing in mind that each company or agency must act within the constraints of its own resources, the following is a list of those organizational components that should play a role, followed by a description of what that role should be.

1. Company or Agency Directors
2. The Central Emergency Committee
3. The Emergency and Disaster Office or Unit
4. The Emergency Operations Committee
5. The Situation Room
6. The Declaration of States of Alert and Emergency

The Company or Agency Directors

The highest decision-making body of the company or institution must establish all policies and strategies concerning emergencies and disasters. Depending on the structure of the company or institution, the relevant body might be a Board of Directors, Executive Board or the General Manager's Office.

The intervention of the decision-making entity with the greatest executive capacity will be most effective and relevant to the extent that there is, under its direct supervision, a specific unit or office responsible for emergency and disaster management. The organizational structure of the water supply and sewerage service company or agency will determine whether the following groups play an advisory role or are in the direct line of command.

In addition, attention must be paid to regulatory authorities, which might have established emergency and disaster response policies to ensure that water supply and sewerage services remain available in a crisis. The conditions for continuity of these services will be included in the Emergency Plans.

Functions and Responsibilities

- Set the general company or agency policy regarding emergency situations;
- Approve the establishment of an emergency and disaster office or unit;
- Appoint the members of the Central Emergency Committee;
- Approve the Emergency Plan and the protocols for declaring a state of alert or an emergency within the company;
- Declare a state of emergency for the company or agency;
- Ask relevant government authorities to declare a state of emergency regarding the water supply and sewerage system if justified by the situation;
- Give consent and support to actions taken before, during, and after an emergency.

The Central Emergency Committee

The Central Emergency Committee is the functional organ in charge of planning, organizing and guiding the use of human, material and financial resources, and any mitigation, prevention, preparedness, response, rehabilitation or reconstruction activities regarding emergencies or disasters. It is a decision-making committee that should be directly accountable to the company's directorate or other relevant top-level body, and will assume maximum authority in emergency and disaster situations.

Structure of the Committee

The Committee should comprise, whenever possible, the company's highest-level decision-makers, including those in charge of the operational, administrative and financial divisions and other units relevant to emergency and disaster management. One option is to invite professionals from other institutions and sectors to be part of the Committee as a way of furthering inter-institutional and cross-sectoral coordination. The Committee should at the very least include representatives from the following areas:

- The general management office;
- The heads of the production, operations and maintenance divisions;
- The head of the administrative and financial division;
- The head of procurement (supplies and transportation);
- The heads of the development, works and engineering departments;
- The head of the planning department;
- The head of the company's public relations department;
- Representatives of the committee that drafted the Emergency Plan;

- The official responsible for representing the company or agency in its interactions with civil defense bodies (in case he or she is not the same as the representative from the company's management office);
- The person in charge of the company's Emergency and Disaster Office or Unit.

The chair of the Committee should be occupied by the highest formal authority among the representatives appointed to the group.

Depending on the size of the organization or the complexity of the system, this Central Emergency Committee may be replicated at a smaller scale in the various geographical regions or sectors in which the company is involved, so as to respond just as effectively to regional emergencies. Whenever necessary, the various committees should be called "operational committees."

The relations of the Central Emergency Committee with civil defense or the national emergency commission, which normally includes representatives from several ministries, the police, and firefighters, are extremely important, particularly for coordinating the actions needed in a disaster situation. Accordingly, it is essential to make sure that a representative of the water supply and sewerage sector is a member of the national emergency commission.

Functions and Responsibilities

The chief role of the Central Emergency Committee is to make the decisions needed to ensure that water supply and sewerage services can be restored in the shortest time possible after an adverse event. This calls for carrying out specific actions at each of the various stages in the disaster cycle.

Its members should meet periodically, at least twice a year or more frequently depending on their work-load, and obviously as often as needed during a state of alert or emergency. They should also discuss and approve the general guidelines for the unit or group entrusted with designing the emergency plan, including guidelines on mitigation, prevention, and preparedness.

The functions of the Central Emergency Committee will depend on the company's policies, characteristics, and organizational structure. In broad terms, however, the following functions should be mentioned:

- Declaring a state of alert based on the relevant protocols established by the company's directors;
- Setting up the emergency and disaster office or unit;
- Monitoring the drafting and implementation of the emergency plan;
- Coordinating the working program with the emergency and disaster unit;
- Monitoring the ongoing staff training on emergency procedures, which should include both theory and practice;

- Assigning priorities, coordinating, and overseeing the appropriate use of resources during an emergency;
- Forging and maintaining communications and coordination with the public institutions responsible for emergency and disaster management, both at the local and national level;
- Maintaining contact with private companies such as suppliers of equipment, chemical products and pipes, professional associations, and subcontractors;
- Coordinating emergency and disaster response efforts with the Emergency Operations Committees;
- Supporting the actions of the Emergency Operations Committees whenever there is a need for intervention at higher levels;
- Establishing the communication procedures, both within and outside of the company;
- Approving and securing the necessary financing for prevention and mitigation programs.

The Emergency and Disaster Unit

It is the responsibility of this office or unit to carry out, on an ongoing basis, the company's internal disaster prevention, mitigation and preparedness actions required by the Central Emergency Committee, as well as to coordinate mitigation and response efforts with other institutions.

In the case of some water supply and sewerage companies or agencies, this office has a formal and permanent place in the organizational chart, which evidently makes it possible to effect improvements in less time. When such a unit is not official, the functions described below must be assigned to the company's operational unit or other units selected for this purpose. Regardless of its internal status, this office is the executor of the guidelines provided by the Central Emergency Committee.

Structure of the Unit

The Emergency and Disaster Unit—or whichever other organizational component is entrusted with the same functions—should comprise a coordinator who is assisted by professionals in operations, maintenance, planning, and engineering, as well as any others who may be needed. The office will work as a technical committee entrusted with specific goals, employing whatever existing technology may be required (such as geographic information systems or GIS). It should be provided with the necessary budget to outsource any specific studies that the company or agency cannot carry out on its own due to lack of specialized personnel. Such studies may include hydrogeology, structural, or soil assessments.

This unit should also be able to requisition technicians and professionals on a part-time basis to engage in specific tasks such as the vulnerability analysis of a treatment plant. This would also require the collaboration of the head of the plant and other professionals.

Functions and Responsibilities

The chief responsibility of the unit must be the formulation, evaluation, control and monitoring of the Emergency and Disaster Prevention and Response Program. To fulfill this mission, the unit must procure vulnerability analyses of each of the components of the company's water supply and sewerage systems, follow up on the design of the operational plans, and carry out periodic evaluations to ensure that the plans remain up to date. In order to perform this work, it is essential for the unit to remain in direct and close contact with the Emergency Operations Committees.

As an emergency measure during the eruption of the Pichincha volcano in Ecuador, in 1999, temporary coverings were installed to protect the water treatment plant from ashfall.

C. Osorio, 1999

Depending on the size and characteristics of the company, this office may transfer some of its responsibilities to the various Emergency Operations Committees.

The following are some of its main functions:

- Coordinate vulnerability analysis of the water supply and sewerage systems with the Emergency Operations Committee or Committees;
- Coordinate specialized vulnerability assessments with private or academic consultants;
- Assess the training needs of all staff regarding emergencies and disasters, including the type and level of training required by the various departments and employees;
- Promote, together with the company's training unit, the training required in the various relevant fields;
- Coordinate training activities with government agencies and universities;
- Review and periodically update the Emergency Plan;

- Ensure that all relevant information has been collected, including personnel and logistical data, plans and diagrams, descriptions of the systems, etc., required for vulnerability analyses and emergency plans;
- Oversee and assess the process for documenting emergencies so that the Emergency Plan remains up to date;
- Gather and document the lessons learned from various emergencies and disasters;
- Represent the company when dealing with civil defense or national emergency agencies.

The role of this unit is crucial when it comes to personnel training, an essential requirement when dealing with emergency situations. One of the key points is to disseminate relevant information to all employees and produce, in cooperation with the company's training unit, a structured training program involving different subjects and levels of detail to meet the needs of the various professionals and technicians who work for the firm. This training program must be carefully aligned with the objectives not only of the Central Emergency Committee but of the company or agency as a whole, so that it is not perceived as extraneous to the firm's core activities.

It is advisable to call upon members of civil defense agencies and universities to assist in training, particularly when it comes to specialized aspects.

A key component of the training must be emergency drills and simulations, which make it possible to assess the teamwork involved, especially decision making in high-pressure situations. Drills and simulations are generally carried out in the field and should cover the full range of potential scenarios, based on the existing hazards, so that the reactions by the staff, especially in terms of decision making, can be evaluated and serve as inputs to further refine the Emergency Plan.

The Emergency Operations Committee

The Emergency Operations Committee, which plays an executive and operational role in disasters and major emergencies, is subordinate to the Central Emergency Committee through the company's Emergency and Disaster Unit or, should one not exist, the Operations Unit.

Depending on the characteristics and complexity of the system or company, several Emergency Operations Committees may be needed: for example, one for the water supply system and another for the sewerage system, or even one for each of the major components of the system. For instance, within the drinking water supply system, one committee might be in charge of production and another one in charge of distribution, their functions differing in terms of the components involved, but complementary in terms of the benefits to the entire system.

The implementation of Emergency Operations and response plans will be in the hands of these Emergency Operations Committees, which should also participate actively alongside the company's Emergency and Disaster Unit in designing the Emergency and Disaster Prevention and Response Program.

Delegation of authority to the various Emergency Operations Committees during a disaster or major emergency is essential for their success.

Structure

The structure of the Emergency Operations Committees will vary depending on the characteristics of the firm, as already noted. In any case, they must include a top-level technical and operational authority as well as representatives from production areas (treatment plant and transmission lines), operational control, engineering and electromechanical maintenance, and administration and logistics.

Functions and Responsibilities

The main objective of the Emergency Operations Committees is to prepare Emergency Operations Plans to confront an emergency situation and carry out the rehabilitation of the services, as well as to cooperate in the execution of the vulnerability analyses and the prevention and mitigation programs.

Other functions it might assume include the following:

- Designing the Emergency Operations Plans;
- Keeping the Emergency Operations Plans up to date;
- Coordinating and guiding emergency preparedness, response and rehabilitation efforts in their respective fields of action, as well as other functions designated by the Central Emergency Committee;
- Participating in post-disaster reconstruction to ensure that the system's vulnerability is reduced;
- Designing or carrying out, with the support of the Emergency and Disaster Unit or Office, the vulnerability analyses and water supply and sewerage mitigation programs;
- Participating in the development of the company's Emergency Plan and helping to ensure that it remain up to date.

The Situation Room

In order to respond in a coordinated fashion to an emergency or disaster, there must be a physical space available that is secure and contains all the resources needed to function optimally during the most critical moments. Such a space is generally known as the "situation room."

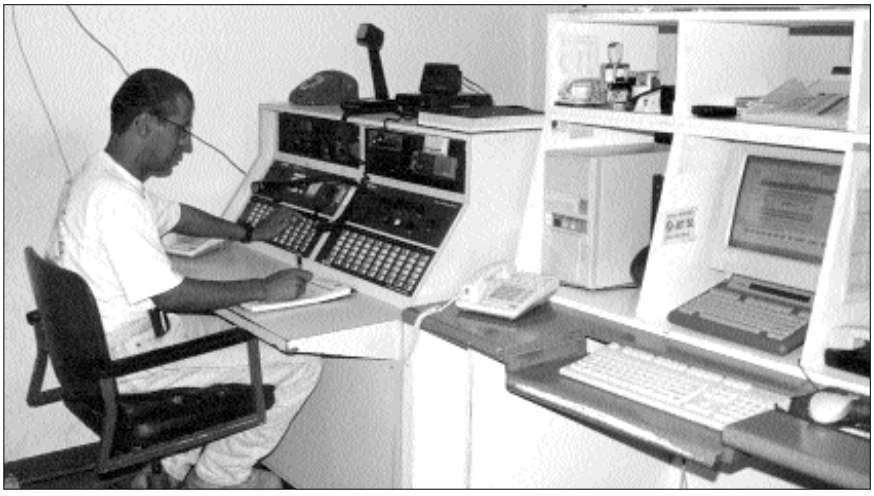
This room is the meeting place of the Emergency Committee and all other key personnel. It is from there that all decisions will be made in response to an

emergency. Control of the situation room will be entrusted to the highest ranking member of the agency or company until the person who chairs the Central Emergency Committee arrives.

One option is for the situation room to be located where the systems control center is in normal situations, taking advantage of the telecommunications and control infrastructure if such is available.

Depending on the characteristics of the agency or company, the situation room may play a national role and be supported by additional situation rooms in each of the regions in which the company or agency operates, or else by situation rooms for each of the systems into which the company is divided. What is outlined here applies to each of these situation rooms.

It is important that the location of the situation room be chosen strategically to allow for easy access and good communications. Above all, it is essential that



Costa Rica's National Risk Prevention and Emergency Response Commission (CNE).

R. Madrigal, 2000

the situation room not be affected in any way by the adverse event. It should be located next to the company's communications center and be permanently equipped with the following items:

- A list of telephone and fax numbers of the company's main officials as well as of key outside contacts;
- A connection to an electrical generator;
- Radio transmission equipment with the necessary communications protocols and power source;
- Radio and television receivers;
- Telephone and fax equipment;
- An Internet connection;
- Copies of the Emergency Plan and annexes;

- Technical specifications and plans of the system;
- Operations control panel or operational information system;
- Desks and meeting-room tables;
- Computer equipment and office equipment and supplies;
- Food and drink;
- Set of keys to all vehicles and infrastructure;
- Basic tools;
- General information, maps and plans of shelters, hospitals, health centers and other strategic facilities in the country.

It is advisable for the Emergency Plan to identify two alternative situation rooms, properly supplied as indicated above. These alternative rooms may be located in production facilities such as treatment plants.

Declaring States of Alert or Emergency

Alerts may be issued by the company or by a governmental agency at the national or provincial level.

A state of alert covers the period between the moment an alert is issued and the mobilization of resources begins, and the moment of impact. In these situations it is prudent to establish two or three levels of alert, depending on the proximity and likelihood of impact. It is also advisable for colors to be assigned to each level of alert. In order to prevent confusion with the states of alert issued by civil defense or national emergency authorities, however, it may be better to employ other systems of classification.

As an example, Table 4 shows the hydrometeorological hazard alert system employed by Costa Rica's National Risk Prevention and Emergency Response Commission (CNE). Boxes 1 and 2 illustrate the phases of alert planned by water supply and sewerage companies in Latin America for response to earthquakes and heavy rainfall.

Safe drinking water in shelters, Hurricane Mitch, Honduras, 1998.

C. Osorio, 1998

Box 1. Declarations of State of Alert and State of Emergency Employed by a Latin American Water Supply and Sewerage Company in Response to Earthquakes

EARTHQUAKES

Declaration of a State of Alert

When a seismic event occurs surpassing level V in the Modified Mercalli Scale, a seismic alert is issued immediately to all members of the Crisis Committee and the Emergency Operations Committees. One explicit indication of an earthquake of such intensity is the interruption of the power supply.

Declaration of a State of Emergency

Its objective is to activate the organization, coordination and resource allocation mechanisms included in the Emergency Plan by declaring an internal state of emergency.

First phase: The deputy managers of the various geographical areas serviced provide information on the condition of the system components compiled during the preliminary damage assessment. It is to be presented to the Emergency Committee no later than 12 hours after the event. During the Emergency Committee meeting, a state of emergency may be declared within the company, part of it, or one of its systems, if the level of damage is catastrophic. The decision to declare a state of emergency is the responsibility of the Chair of the Committee, as stipulated in the Chair's functions and responsibilities contained in the Emergency Plan. If the general state of the components is not catastrophic after the preliminary assessment, a more detailed assessment will be carried out to review the situation, as described in the second phase.

Second phase: Area deputy managers are convened to report to the Emergency Committee on the information compiled during the detailed damage assessment, which should be completed no later than two days after the event. The meeting will be convened on the third day after the impact of the catastrophic event, and its members will discuss whether to declare a state of emergency for the company, and whether it should be company-wide or only apply to some of its parts or systems. The Chair of the Committee will decide whether to declare a state of emergency.

Depending on the impact of the adverse event, whether sudden onset (earthquakes, floods down slopes, volcanic eruptions or certain types of landslides) or gradual onset (drought, flatland floods, environmental degradation, or certain types of landslides), different states of alert may arise. The Emergency Plan must specify in various protocols how to handle each of these types of emergencies. The protocols must be approved by the Board of Directors of the company and be widely known by the company staff.

States of emergency declared outside of the country (e.g., by the civil defense, National Emergency Committee, state or municipal governments) should immediately activate the Central Emergency Committee. Such external declarations need not coincide with the company's internal declarations of states of emergency, or vice versa.

In the event of sudden-onset emergencies or disasters, the Emergency Plan should be activated immediately, and it should stipulate clearly what procedures to apply. In the case of gradual onset emergencies, states of alert of different levels may be declared in order to take preventive measures and mitigate the potential effect of the phenomenon in question, such as preventive maintenance actions, specific training and drills, guidelines issued to the company's customers, or the signing of agreements not previously arranged with other institutions.

Box 2. Declaration of State of Alert and State of Emergency Employed by a Latin American Water Supply and Sewerage Company in Response to Heavy Rainfall

HEAVY RAINFALL

Each area deputy manager's office must obtain and analyze meteorological forecast information that makes it possible to identify the likely or potential effects of unusually heavy precipitation levels. It should also produce a report indicating the likely damage scenario and the works needed to mitigate it. The report should be submitted to the Engineering and Planning Manager's Office. For the winter season, forecasts should be submitted by 30 April. Estimates of water volume resulting from snow thaw should be submitted before 1 December.

Declaration of a State of Alert

Based on the forecasts contained in these reports, the Engineering and Planning Manager will declare a state of alert for any given water supply or sewerage system, or all of them. Measures will also be taken to reduce the impact of extreme precipitation by carrying out some or all of the works contemplated in the Plan.

Declaration of a State of Emergency

To the extent that the system components are damaged due to floods, power outages, blocked roads, or major leaks, the production and network supervisors must inform the Engineering and Planning Manager, who, based on the information received, may convene the Emergency Committee. At the meeting, the decision may be taken to declare a state of emergency and to take all the measures planned for such a situation, such as contracting personnel and services, or the acquisition of required materials.

The state of emergency is that which follows the actual impact of the disaster or emergency. It should be declared when the event is imminent or, in the case of sudden catastrophes, as soon as it has occurred.

The declaration of the state of emergency requires that the members of the Central Emergency Committee meet immediately, and activate all legal, administrative, logistical and operational measures stipulated in the various procedures and protocols agreed upon beforehand.

Table 4. Hydrometeorological hazard alert system –CNE

ALERT	DESCRIPTION	ACTIONS	RESPONSIBLE INSTITUTIONS
GREEN	Inform	Inform CNE's Chairman and Board of Directors, Regional Emergency Committees (CREs), Local Emergency Committees (CLEs), other institutions and the media	National Meteorological Institute Risk Management Directorate
YELLOW	Prepare for: Indirect Effects	Inform CNE's Chairman and Board of Directors Activate CREs and CLEs Manage public information Verify supplies at central level, CRE level, CLE level Contact suppliers Arrange transportation Convene situation room personnel Activate additional resources of the Information and Analysis Center (CIA) and the Emergency Information System (SIE) Mobilize CNE personnel, based on priorities, to headquarters and the affected area Establish communication points for CLEs	National Meteorological Institute Risk Management Directorate Executive Directorate
	Direct Effects	Inform CNE's Chairman and Board of Directors Activate the Public Emergency Information System (SIPE)/ SIE Prepare supplies Activate security and traffic procedures Open temporary shelters Declare Emergency Operations Center (COE) in permanent session Mobilize CNE personnel to the affected area	
RED	Evacuate Indirect Effects	SIPE activated CIA activated CREs and CLEs proceed to carry out preventive evacuation of high-risk areas Temporary shelters open Resources mobilized Damage and needs assessment	National Meteorological Institute Risk Management Directorate Executive Directorate Board of Directors President of the Republic
	Direct Effects	Massive evacuation SIPE, COE, SIE, CIA activated Security operations underway Temporary shelters open Resources mobilized Damage and needs assessment Rehabilitation of lifelines and key infrastructure	

Emergency Operations Plans

The purpose of Emergency Operations Plans is to foresee, in as much detail as possible, all activities that must be carried out by each of the company departments and employees immediately after a disaster has struck in order to rehabilitate water supply and sewerage systems in the shortest time possible and provide the affected population with clean, safe water. Box 3 outlines basic principles of these plans.

Emergency Operations Plans, which, as already noted, form part of the Emergency and Disaster Prevention and Response Program, play an administrative role in the technical and operational area, since they specify which actions each employee must carry out. Having such plans is critical when the effects of a disaster or major emergency could lead to widespread confusion or when, as a result of the emergency, not all required personnel are available.

Bearing in mind the various components of the company and the existing units for system operation and maintenance, Emergency Operations Plans must be tailored to specific hazards prevalent in the area. Thus, the unit in charge of water diversion and treatment (production) should have Emergency Operations Plans for earthquakes, volcanic eruptions, drought, floods and other potential hazards in its area of coverage. The same is true of the units in charge of maintaining the electromechanical equipment, drinking water distribution networks, waste water collection systems, and so on.

These Emergency Operations Plans have two well-defined features: the first, the type of hazard it is meant to respond to; the second, the type of work that needs to be carried out to rehabilitate those components that have been compromised as a result of a disaster.

For instance, if a landslide has affected the drinking water supply by causing leaks in the distribution network, two kinds of action must be taken: one involving operations, the other involving maintenance. In order to prevent loss of water through leaks in sections damaged by the landslide, the company's operational personnel must take specific actions such as closing check valves to cut off the water supply to the affected areas while ensuring that most of the customers in other areas continue to receive services. Meanwhile, the maintenance staff must carry out a prompt inspection and repair the affected sectors in order to rehabilitate the system in the shortest time possible. Necessary security measures are necessary to protect the staff members involved in the repairs.

Given the two main features discussed above, the design of the Emergency Operations Plan should include pre-disaster actions, including possible simulations.

The plans must contain clear and precise instructions for responding to each

of the situations that may arise in a given emergency, based on the vulnerability studies. Each of the hazards analyzed must have its own set of instructions, contained in individual manuals.

One such manual, for example, may cover the actions should an earthquake affect a given component, such as shutting the exit valves of storage tanks. The manual would describe which tanks should be shut down, by name and location, which valves must be shut, and what their number and location is. If necessary, a map or diagram should be included to help with the location of the valves.

Box 3. Basic principles of the Emergency Operations Plan

- The Emergency Operations Plan should not be a plan to develop a plan. It must be the plan itself.
- The Plan should not be an organizational guidance project that merely lists functions and responsibilities. It must describe the objectives and methods for using resources to achieve these objectives.
- The Plan must specify who will do what, where, and when, based on the existing resources and organizational structure.
- The Plan must be dynamic. It should be updated whenever there is a change in resources, personnel training, or the vulnerability of the system.
- The Plan must be clear, concise, and complete. Emergency operations should not be described in excessive detail. Rather, the Plan should be a guide to action that specifies certain key details.
- The Plan must be designed with the participation of those employees of the various operational areas who have hands-on experience and knowledge of the system. Such staff might include operators of treatment plants and pumping stations, water quality technicians, network maintenance staff, and other operational control personnel.
- The Plan must be widely disseminated and known by the staff.
- The Plan must be complemented with instructions on the most relevant actions in case of an adverse event.

The Development of an Emergency Operations Plan

- The main attribute of an Emergency Operations Plan is that it provides the mechanisms needed to facilitate effective and swift decision-making.
- The Plan should include objectives, strategies, and actions required to confront emergency situations.

- The Plan is activated immediately after the declaration of a state of alert or emergency, as the case may be.

To illustrate the three points highlighted above, consider the impacts of a flood that reduces the quality of the water supply. Assuming that the objective of the company is to provide drinking water, the correct strategy would be to suspend the inflow of water of poor quality into the storage tanks. Measures would be taken to ration the water already in the tanks so that there is enough at least for basic human consumption until the quality of the incoming water makes it possible to return to normal distribution.

This procedure, which is part of the company's decision-making process and takes into account technical criteria and existing restrictions, must be presented in the Emergency Operations Plan in a clear, precise manner.

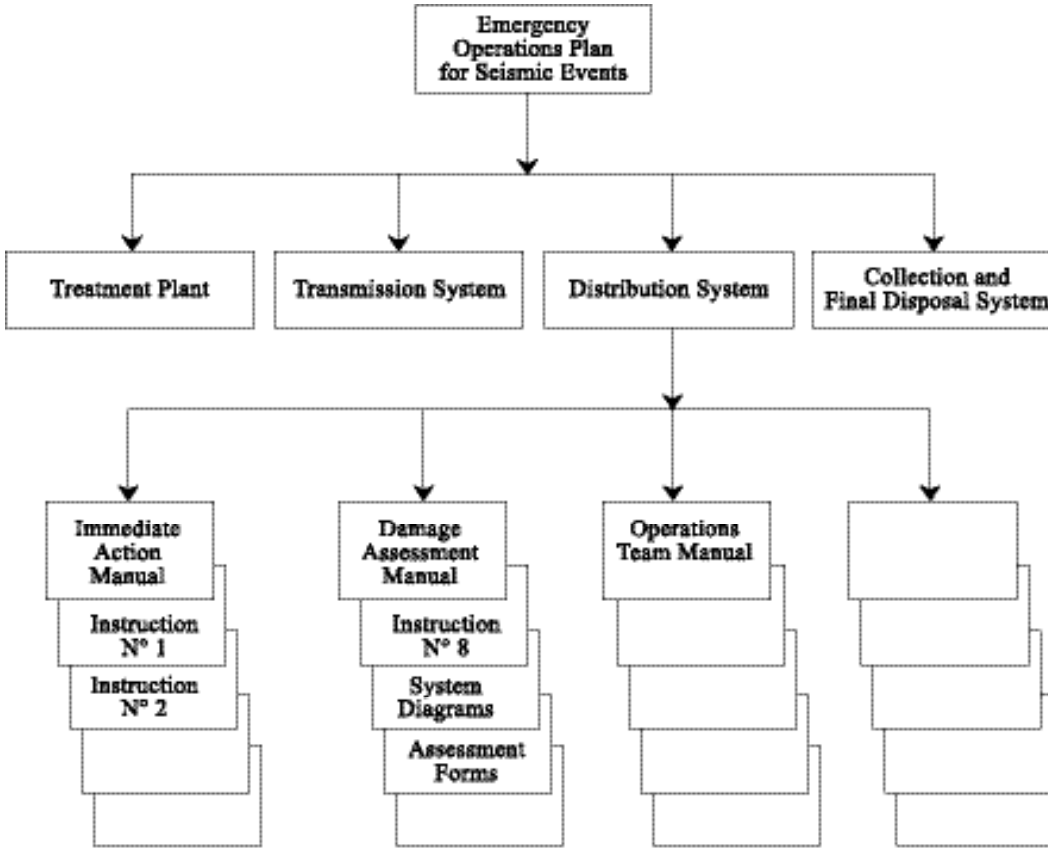
When the time comes to design the Emergency Operations Plan, a key input will be the technical procedures manual for the operation and maintenance of the company's drinking water and sewerage systems. If such a manual is not available, the task of developing an Emergency Operations Plan will be a great deal more difficult.

Instructions for Emergency and Disaster Situations

The Emergency Operations Plan contains a series of instructions that each staff member or company unit must carry out in the face of a potential adverse event, including the assessment of the current condition of the company's systems. It presupposes the participation of employees with a great deal of knowledge and experience in the management of the systems.

Table 5 shows the structure of the Emergency Operations Plan. Two examples of instructions in the event of an earthquake follow (Tables 6 and 7).

Table 5. Structure of the Emergency Operations Plan in the Event of an Earthquake.[8]



[8] Pan American Health Organization, *Planificación para atender situaciones de emergencia en sistemas de agua potable y alcantarillado. Cuaderno Técnico N°37* (Washington, D.C.: PAHO ,1993).

Table 6. Activation of the Emergency Operations Committee—Operating Instructions[9]

Purpose: Activation of the Emergency Operations Committee	
Event:	Earthquake
Action:	Immediate actions
Activity:	Activation of the Emergency Operations Committee
Responsible unit:	Emergency Operations Committee

During Working Hours:

Activate the Emergency Operations Committee and all its regular or alternate members, who should gather in the situation room.

The members of the Emergency Operations Committee comprise the following officials:

- Highest technical and operational authority;
- Representatives from production, operational control, engineering and electromechanical maintenance, administration, and logistics.

An up-to-date list of all members, their positions, addresses and telephone numbers should be available.

Should some of the members be away from the workplace, they must get in touch with the situation room and indicate their location and possibility of returning to the workplace.

Outside of Working Hours:

Should there be an official in charge at the time of the earthquake, he or she must remain in the situation room and take charge of all immediate actions needed until a higher-level member of the Committee arrives.

The other Committee members must arrive as quickly as possible at the situation room. In the event of any delay, they must call the situation room as soon as possible.

General Considerations

Once all or some of the Emergency Operations Committee members have gathered in the situation room, they will assume full command over all emergency operations and proceed to carry out Instruction 2: Organization of the Emergency Response Teams.

Moreover, the Chair of the Emergency Operations Committee, or whoever is acting as his or her substitute, should contact the Central Emergency Committee and establish ongoing communications as indicated in Instruction 4, Communications.

Situation Room

Complete address, telephone numbers, radio frequency and code.

[9] Ibid.

Table 7. Instructions for Convening Emergency Response Teams – Operating Instructions

Purpose: Activation of the Emergency Response Teams

Event:	Earthquake
Action:	Immediate actions
Activity:	Activate the Emergency Response Teams, allocate resources and working areas
In command:	Head of Operations and Maintenance (Name)

Guidelines:
The activation of the Emergency Response Teams occurs much as in a normal situation, except for the Damage Assessment and Quality Control Teams, which must comprise staff specifically trained for these purposes.

1. The basic teams that will act within the jurisdiction of the distribution unit in charge of the system will be the following:
   - Damage Assessment Team (name of the team, members, and shifts);
   - Operations and Distribution Team (name of the team, members, and shifts);
   - Water Quality Control Team (name of the team, members, and shifts).

If the jurisdiction is large and ordinary operations and maintenance tasks have been divided into sectors, this arrangement should continue as long as the existing and available resources allow it. These sectors apply to the Distribution and Rehabilitation Teams. Damage Assessment and Quality Control Teams will act according to their own program functions, which are outlined in the corresponding instruction manual.

2. Next, the boundaries and the zones or units that make up the sectors must be described. These sectors must be represented on the Emergency Operations Committee.

3. The structure of the Emergency Response Teams must be described succinctly, based on the activities each is meant to carry out, taking into account the following:
   - Activity to be carried out;
   - Minimum staff required;
   - Tools for carrying out the activities (including the relevant manuals, which will guide the teams' actions).

The following are some aspects that must be taken into account when preparing the emergency instructions of some of the key departments of the company involved in emergency and disaster response, as well as other aspects that must be a part of the Emergency Operations Plans.

• *Finance*

The finance department must carry out several activities in preparation for emergency situations, and others following the impact of a disaster.

Before the disaster or emergency, normal procedures must be reviewed so that, while guaranteeing their correct use, available funds can be mobilized quickly and effectively for the procurement of supplies and payment for services during the emergency. For example, if there is rule that all acquisitions above a certain amount require three different quotes from suppliers, it should be stipulated that in an emergency situation supplies or services can be purchased directly. In short, it is advisable to have a protocol regarding the declaration of states of alert or emergency that can activate financial procedures for exceptional cases.

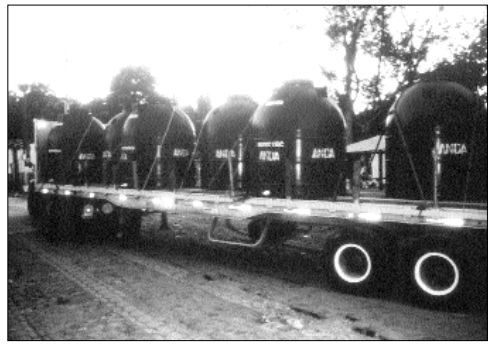
Immediately after the event, it is important to make the necessary resources available for procurement, feeding the staff, contracting equipment and machinery, etc., while carefully monitoring the use of the funds.

Depending on the location of the emergency and the prevailing conditions, it may be necessary for financial staff to travel to the affected areas in order to provide support in the application of budgetary controls and other functions.

• *Supplies and Services*

In the supplies and services area, there should be early identification of resources (both internal and external to the firm) that may be needed in an emergency situation, such as staff, equipment, or machinery. In emergencies, outsourcing and acquisitions must be expedited, as well as the loan of materials and resources by other companies. A common example is the need for water trucks, which may be loaned by another water supply company or hired from private firms such as breweries or dairies, preferably having negotiated in advance the fees that will be charged.

As in the case of the financial unit, it is necessary for units responsible for procuring supplies and services to review standard procedures in view of current vulnerabilities and the potential impact of emergencies and disasters on the system, so that the actions required during an emergency can be carried out with maximum efficiency.



A truck is adapted to distribute water tanks because of a shortage of water trucks in El Salvador.

R. Saenz El Salvador, 2001

Units responsible for procuring supplies and services should provide support to the operational area by establishing agreements or contracts with private companies that can provide the necessary services, such as construction companies or engineering consultants. An updated list of suppliers and contracts or agreements signed specifically for emergency response will help expedite solutions to the many problems caused by an emergency.

Similarly, an inventory of available in-house and external vehicles and machinery must be completed so that in a crisis situation they can quickly be mobilized.

It is advisable for the Emergency Operations Plan to include measures to be taken should an emergency arise outside the normal staff working hours so that resources in storage areas and at other sites can be mobilized promptly.

• *Communications*

Communications are crucial in emergency and disaster situations. It is advisable to deal separately with internal and external communications. In both cases, it is important to define the communication flows and priority levels of communication to discourage interference and imprecise, inaccurate communications.

Damage to a water company's storage facility in Tegucigalpa, Honduras, following Hurricane Mitch.

SANAA -Honduras, 1998

As noted in the section on the establishment of the Emergency Operations Committee, it is advisable for an official from the public relations department of the company or agency to be a member, so as to assist in all matters related to the communications strategy, including internal messages and contacts with the mass media.

Internal Communications

The company's internal communications respond to various needs. Hence it is necessary to identify the proper communication channels and select the most opportune times to disseminate the required information.

As the Emergency Operations Plan is developed, along with the vulnerability analyses and prevention and mitigation programs, pertinent information about these activities should be provided to the staff. It is useful to employ the communication mechanisms already in place within the company, such as newsletters, technical publications, internal memos, meetings of heads of departments, and staff meetings of the various departments or plants.

Once the Emergency Operations Plan is available, it must be made widely known to all the staff, including evacuation plans and recommendations from the occupational health unit (regarding risks of accidents, vaccination needs, etc.). The resources of the training unit can play a role in these dissemination activities.

The Emergency Operations Plan must include all the information that may be required in an emergency, such as a list of key officials, their addresses, telephone numbers, and so on, since they will have to be contacted urgently and informed of the state of alert. During the impact, in addition to the predefined procedures for internal and external communications, the situation room must be able to gather all the information needed for decision-making.

External Communications

With external communications, as with internal communications, the target audiences must be clearly identified. These will include the company's suppliers, government authorities, other companies providing the same or similar services (e.g., other utilities), the media, users of the services, and the general public.

Depending on the situation, after a disaster has struck it may be necessary to report which locations will have access to the company's services, on what days and at what time. To disseminate these messages, a variety of channels and techniques may be used, such as mass media (radio, television, newspapers), megaphone vans, religious services, or community message boards.

The public relations representative is the official who, in coordination with the chair of the Central Emergency Committee and members of the company's directorate, will issue statements to the press, so that the information provided is accurate. Authorized and well-informed spokespeople, supported by the inputs of technicians and specialists, are crucial to ensuring that the information provided is clear and effective.

In such situations, radio, television, and print media are among the best ways to disseminate information, whether through paid announcements or press conferences.

It may happen that a disaster does not affect the water supply and sewerage systems. However, the company or agency is not isolated from its environment, and damages to other companies or sectors, such as power utilities or the road system, may in turn affect the operations of the water supply and sewerage systems. Open communications with other entities is therefore essential.

• *Coordination Between Sectors*

In a disaster, the degree to which the water supply and sewerage company or agency can coordinate its efforts with other sectors is crucial, both before and in the aftermath of the event. It is highly advisable for such coordination to be structured in advance, since this will greatly facilitate matters in a state of alert or emergency.

Coordination procedures may be within the sector or between different sectors. In the former case, they apply to suppliers, subcontractors, other companies providing sanitation services, and communities. Coordination with other sectors implies activities targeting the ministries of health, of public works and transportation, of energy and the environment, as well as civil defense and national emergency commissions, the armed forces, the police, municipal governments, hospitals, organized community groups, and other key institutions.

For coordination to be effective, a work plan must be in place. The first step is to identify the likely needs of the water supply and sewerage company or agency, as well as the needs of other facilities dependent on water supply and sewerage systems, such as hospitals, shelters, or firefighter units. Exchange of information among these entities is needed. For instance, the power utility should guarantee that it will assign a high priority to the power lines that feed pumping stations and treatment plants. Similarly, drinking water distribution areas must be identified and prioritized, so that hospitals, health centers, shelters and prisons are guaranteed an adequate supply of water.

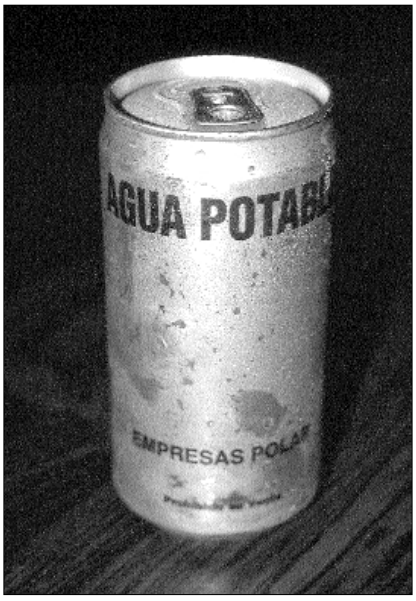
Finally, the procedures for carrying out coordination activities must be agreed upon, preferably in protocols regarding each likely scenario. One of the aspects to bear in mind is land-use management, since water supply and sewerage systems must often service highly vulnerable areas.

• *Community Participation*

Community participation within the Emergency Operations Plan involves several aspects, including:

- Community cooperation in response activities and rehabilitation of the water supply and sewerage services, given their own interest in these services, particularly in the case of rural water supply and sewerage systems;
- The role of the community through its representatives in municipal governments and civil society organizations;
- The organization of the community for the distribution of drinking water during the emergency.

The community, as the primary users of water supply and sewerage systems, must also be involved in training efforts and be adequately informed of what to do when emergencies and disasters disrupt normal services.



A private company cooperated in the distribution of drinking water following devastating landslides in Venezuela in 1999.

C. Osorio, 1999

During an emergency, it is frequently necessary to rely on the help of members of the community, whether individually or as part of an organization. For instance, they can help locate new water sources, manage some of the water distribution points, or distribute chlorine for disinfection of drinking water.

Each region has its own characteristics. It is therefore wise to analyze the local culture and incorporate, in the development of the emergency plans, the most active community groups. Just as agreements can be reached in advance with the private sector, agreements should be made with community groups. The community should be trained so that its organizations can contribute to prevention and response efforts.